

REMARKS/ARGUMENTS

Previously presented Claims 1-14 are pending in the Application.

The Examiner objected under 35 U.S.C. 135(a) to Applicant's previous amendments to the Specification at page 23, line 7 [0035], which relabeled the original "(Examples 1 to 7, Comparative Examples 1 to 3)" as (Examples 1 to 6, Referential Example 1, Comparative Examples 1 to 3), and at page 24, Table 2, which relabeled original "Example 7" as Ref. Ex. 1 as having added new matter. Office Action dated November 24, 2009 (OA), page 2, paragraph 3. The Examiner required Applicant to cancel the new matter in reply (OA, p. 2, last sentence). Accordingly, the Specification is presently amended at pages 23 and 24 to reinstate the originally filed language and designations..

No new matter is added.

Applicant appreciates the Examiner's withdrawal of all prior objections and rejections of previously presented claims under 35 U.S.C. 102 over Fischer (U.S. Patent 4,906,696, issued March 6, 1990) and under 35 U.S.C. 103 over Fischer in view of Okazaki (JP 11-181197, published July 6, 1999). The Examiner retained the rejection of previously presented Claim 3 over Sato (JP 01-115914, published May 9, 1989) in view of Fischer and entered multiple new grounds of rejection.

Objection under 35 U.S.C. 135

The Examiner objected to Applicant's previous amendments to the Specification at pages 23-24 and required Applicant to cancel the new matter in response (OA, p. 2, ¶ 3). Applicant has acted as directed to cancel the objectionable designations and reinstate the original language and designations at pages 23-24 of the Specification. Accordingly, the Examiner's objections under 35 U.S.C. 135 should be moot.

Rejections of Claims 1 and 3-5 under 35 U.S.C. 102(b) over Kawakami

Previously presented Claims 1 and 3-5 were rejected under 35 U.S.C. 102(b) as anticipated by Kawakami (JP 59-078219, published May 7, 1984)(OA, p. 3, ¶ 4). As did the Examiner, we refer and cite to the machine translation supplied with the Official Action. The rejection should be withdrawn.

Applicant's claims are directed to "[a] flowability improver for engineering plastics" which comprises a polymer (A) comprising 50-99.5 mass% of aromatic vinyl monomer unit (a1), 0.5-50 mass% of a phenyl or substituted-phenyl (meth)acrylate monomer unit (a2), and 0-40 mass% of another monomer unit (a3); wherein the polymer (a) has a weight average molecular weight of 5000 to 150000. Previously presented dependent Claim 2, which is not rejected as anticipated by Kawakami, is limited to the polymer having a weight average molecular weight of 5000 to 100000.

The Examiner finds that Kawakami describes a polymer formed from 15 wt% t-butyl styrene, 40 wt% styrene, and 45 wt% phenyl methacrylate having a molecular weight of 140000 (Kawakami, pp. 7-8, copolymer (4))(OA, p. 3, ¶ 4). The Examiner finds (OA, p. 3, ¶ 4; emphasis added):

Copolymer has improved fluidity and thermal stability in the molten state and can be molded by injection molding . . . . Given that compositional limitations are met, it is the examiner's position that copolymer of Kawakami . . . is inherently capable of functioning as a flowability improver for engineering plastics.

The Examiner's finding is clearly erroneous because, as is evident both from Applicant's disclosure and Kawakami's disclosure, a polymerization product having 50-99.5 mass% of aromatic vinyl monomer units and 0.5-50 mass% of a phenyl or substituted-phenyl (meth)acrylate monomer units and a weight average molecular weight of 5000 to 150000 is not inherently, necessarily, or inevitably "capable of functioning as a flowability improver for engineering plastics" as Applicant's Claim 1 expressly requires.

First, Kawakami's copolymers are thermoplastic polymers useful themselves as the base polymers suitable for injection molding, compression molding, etc. (Kawakami, p. 2, last ¶). Nowhere does Kawakami reasonably suggest that the copolymers disclosed are "capable of functioning as a flowability improver for engineering plastics". To the contrary, Kawakami's copolymers are the primary components of an optical element which are obtained by molding the copolymers (Kawakami, p. 2, ¶ 2). All of Kawakami's copolymers have a molecular weight of at least 110000, and the only copolymer formed from a monomeric mixture comprising phenyl or substituted-phenyl (meth)acrylate has a molecular weight of 140000 (Kawakami, pp. 7-8, bridging ¶). Each of Kawakami's copolymers itself has a high thermal deformation temperature, high impact strength, and low decomposability. Each copolymer excels in high temperature optical properties and is itself designed for high flowability during heating and optimum moldability (Kawakami, p. 6, ¶ 1). The kind of improved high temperature flowability Kawakami describes is not related to its utility as a "flowability improver for [other] engineering plastics". Kawakami does not suggest adding its copolymers to engineering plastics as a flowability improver. The technical concept to which Applicant's claimed invention is directed is unrelated to moldable thermoplastic copolymers which alone show superior high temperature flowability. In fact, Kawakami teaches away from using its copolymers as flowability improvers in other melt molding engineering plastics (Kawakami, pp. 3-4, bridging ¶):

While the fluidity of a resin generally increases when the molecular weight is reduced, it results in a decrease in heat distortion temperature and, thus deterioration of heat resistance. Therefore, there has been a demand for a resin composition with improved fluidity, high heat distortion temperature, and satisfactory moldability.

Moreover, Applicant's Specification teaches that superior flowability is obtained using the claimed "flowability improver" when melt molding engineering plastics because a phase separation results at the time of melt molding (Spec. [0007]):

The flowability improver for engineering plastics of the present invention has a phase separation behavior at the time of melt molding with engineering plastics such as a polycarbonate resin and has compatibility (affinity) with good level of peel resistance in the temperature range of use of the molded articles. By this reason, the present flowability improver can impart remarkable melt flowability (moldability) and peel resistance of engineering plastics by mixing with engineering plastics.

Thus, Kawakami not only does not suggest or recommend using its copolymers as flowability improvers, but Kawakami also does not recognize what properties and characteristics are essential for a copolymer to function as a flowability improver for engineering plastics. The evidence of record as a whole strongly suggests that the copolymers Kawakami describes are not inherently, necessarily, or inevitably “capable of functioning as a flowability improver for engineering plastics”.

“Patentability is “not . . . determined on the basis of the obviousness of the structure alone.” *In re Papesch*, 315 F.2d 381, 391 (CCPA 1063). “[A] compound and all of its properties are inseparable; they are one and the same thing.” *Id.* Accordingly, prior art which does not necessarily, inevitably, or inherently describe the properties of a copolymer, does not necessarily, inevitably, or inherently describe the copolymer itself. Something that is inherent must inevitably be the result each and every time. *In re Oelrich*, 666 F.2d 578, 581 (CCPA 1981). The fact that a certain result or property may occur or may be present in the prior art compositions is not sufficient to establish the inherency of that result or characteristic. *In re Rijckaert*, 9 F.3d 1531, 1534 (Fed. Cir. 1993).

To establish inherency, the . . . evidence “must make clear that the missing descriptive matter is necessarily present in the thing described in the reference, and that it would be so recognized by persons of ordinary skill. Inherency . . . may not be established by probabilities or possibilities. The mere fact that a certain thing may result from a given set of circumstances is not sufficient.”

*In re Robertson*, 169 F.3d 743, 745 (Fed. Cir. 1999)(citations omitted; emphasis added).

In relying upon the theory of inherency, the examiner must provide a basis in fact and/or technical reasoning to reasonably support the determination that the allegedly inherent characteristic necessarily flows from the teachings of the applied prior art.

*Ex parte Levy*, 17 USPQ2d 1461, 1464 (Bd. Pat. App. & Inter. 1990).

Here, Kawakami does not teach or reasonably suggest that its t-butyl styrene (15 wt%), styrene (40 wt%), phenyl methacrylate (45 wt%) copolymer with a molecular weight of 140000 is a flowability improver or “is inherently capable of functioning as a flowability improver for engineering plastics.” (OA, p. 3, ¶ 4). Based on the evidence of record as a whole, it would have been apparent to persons having ordinary skill in the art that “the missing descriptive matter is [NOT] necessarily present in the thing described in the reference . . . .” *In re Robertson*, 169 F.3d at 745. Accordingly, the Examiner’s finding that Applicant’s claimed “flowability improver for engineering plastics” is anticipated by Kawakami is clearly erroneous.

Rejections of Claims 1-9 and 12-14 under 35 U.S.C. 103 over Kawakami in view of Fischer

Previously presented Claims 1-9 and 12-14 were rejected under 35 U.S.C. 103 over Kawakami in view of Fischer (OA, p. 3, ¶ 5). For the reasons stated hereafter, the rejections should be withdrawn.

Again, the Examiner points to Fischer’s Example 10 (Fischer, col. 10, lines 15-31). We also consider Fischer’s Examples 11-12 (Fischer, col. 10, lines 34-62). In Example 10, Fischer describes a polymer prepared by polymerizing 60 parts by weight MMA (methyl methacrylate), 20 parts  $\alpha$ -MS ( $\alpha$ -methylstyrene), and 20 parts PhMA (phenyl methacrylate)(MW=89000). In Example 11, Fischer describes a polymer prepared by polymerizing 55 parts by weight MMA, 20 parts  $\alpha$ -MS, and 20 parts PhMA (MW=130000). In Example 12, Fischer describes a polymer prepared by polymerizing 45 parts by weight MMA, 10 parts S (styrene), and 45 parts PhMA (MW=102000). In each example, the proportion of aromatic vinyl monomer (a1) is no more than 20% by mass. In all of Applicant’s currently amended and new claims, the flowability improver polymer comprises no less than 50% by mass of aromatic vinyl monomer (a1). Accordingly, no flowability improver Applicant claims is either described or reasonably suggested by Fischer.

The Examiner also points to Fischer's Example 61. That thermoplastic blend comprises 90 parts by weight of a polycarbonate resin mixed with 10 parts of the copolymer of Fischer's Example 10 (OA, p.4).

Based on the above-mentioned evidence, the Examiner concludes that persons having ordinary skill in the art would not have been restricted by Fischer's limited teaching with regard to the proportions of monomers used to form its copolymers and would not have been hindered in its experimentation by Fischer's disclosure (OA, p. 4). Rather, the Examiner finds that, despite Fischer's limiting disclosure, the melt viscosity of moldable polycarbonate resins generally may be improved by the addition of any and all thermoplastic polymethacrylate copolymers without detrimentally effecting any of its other significant properties (OA, p. 4). The Examiner finds (OA, p. 4), "As a rule compatibility decreases with increased molecular weight and the preferred molecular weight is from 5,000 to 150,000 (column 6, lines 48-66)."

First, no transparent thermoplastic polymer Fischer broadly contemplates or reasonably suggests comprises more than 40 wt% of the optional  $\alpha,\beta$ -unsaturated monomers (Fischer: Abstract; col. 3, ll. 40-66; col. 4, ll. 27-41; col. 5, ll. 18-50; and col. 6, ll. 25-35). Fischer defines  $\alpha,\beta$ -unsaturated monomers as including aromatic vinyl monomers such as styrene and  $\alpha$ -methylstyrene (Fischer, col. 4, ll. 27-30; col. 6, ll. 29-35). Applicant's currently claimed improver polymer (A) is formed from monomers necessarily comprising at least 50% by mass of an aromatic vinyl monomer (a1).

Second, contrary to Fischer's teaching, Applicant's Specification teaches that superior flowability is obtained using the claimed "flowability improver" in melt molding engineering plastics because of its "phase separation behavior" (Spec. [0007]). Contrary to Fischer's teaching, when Applicant's claimed "flowability improver" is used in melt molding engineering plastics (Spec., [0007]; emphasis added), "The claimed flowability improver for

engineering plastics of the present invention has a phase separation behavior at the time of melt molding with engineering plastics such as a polycarbonate resin and has compatibility (affinity) with good level of peel resistance in the temperature range of use of the molded articles. By this reason, the present flowability improver can impart remarkable melt flowability (moldability) and peel resistance of engineering plastics by mixing with engineering plastics.” Thus, Applicant’s copolymer compositions improve melt flowability (moldability) by promoting phase separation. To the contrary, the success of Fischer’s copolymers depends on preventing the phase separation which normally results when increasing the molecular weight of the copolymer. Fischer expressly states (Fischer, col. 6, ll. 48-52; emphasis added):

It is known that the compatibility of polymers in blends depends on their degrees of polymerization. As a rule the compatibility decreases with increasing molecular weight of the polymers, with the blend then becoming two-phased or multiphased.

Thus, Fischer not only would have taught persons having ordinary skill in the art that copolymers having an aromatic vinyl monomer content of no more than 40 wt%, e.g., polymers formed from monomeric compositions comprising 45-60 parts by weight MMA, 10-20 parts by weight MS or S, and 20-45 parts by weight PhMA (Fischer’s Examples 10-12), may be used to improve the melt viscosity of engineering plastics but also would have taught persons having ordinary skill in the art that copolymers which may be used to improve the melt viscosity of engineering plastics generally have molecular weights no higher than 130000, e.g., MW = 89000 as in Fischer’s Example 10, MW = 130000 as in Fischer’s Example 11, and MW = 102000 as in Fischer’s Example 12. Thus, persons having ordinary skill in the art reasonably would not have expected Kawakami’s copolymers which were formed from monomeric compositions comprising 15 parts by weight of t-butyl styrene, 40 parts by weight of styrene, and 45 parts by weight of phenyl methacrylate and have a

molecular weight of 140000 could be effectively used to improve the melt viscosity of engineering plastics.

Kawakami does not suggest mixing its high molecular weight copolymers with other engineering plastics to improve their melt viscosities of for any other purpose. Kawakami most certainly does not suggest that its high molecular weight copolymers would be effective as flowability improvers for moldable polycarbonate resins. And, Fischer reasonably would have led persons having ordinary skill in the art to understand that highly polymerized, higher molecular weight copolymers formed using 60% by mass of aromatic vinyl monomers, such as Kawakami discloses, would not be useful as flowability improvers for engineering plastics because they promote the phase separation which Fischer deems undesirable (Fischer, col. 6, ll. 48-52).

To rebut any possible suggestion that the thermoplastic compositions and the molded articles of Applicant's Claims 6-9 and the flowability improvers of Applicant's dependent Claims 12-14, formed from 60 to 99.5% by mass of aromatic vinyl monomer (Claim 14), 75 to 90% by mass of aromatic vinyl monomer (Claim 13), and 75 to 99.5% by mass of aromatic vinyl monomer (Claim 12), would have been prima facie obvious to a person having ordinary skill in the art in view of the combined teachings of Fischer and Kawakami, Applicant points to Production Examples 1-6 in Applicant's Table 2 (Spec., p. 24). Production Examples 1-6 show that polycarbonate compositions were improved by Applicant's claimed flowability improvers including 60-80% by mass of styrene and 20-39% by mass of PhMA (see the corresponding improver compositions in Applicant's Table 1 at page 22 of the Specification). Those examples show far superior melt flowability and chemical resistance than do comparative compositions comprising more than 50% by mass of styrene but no phenyl or substituted phenyl (meth)acrylate monomer (Table 2, Comparative Example 2) and comparative compositions comprising less than 50% by mass of styrene and more than 50%



by mass of phenyl or substituted phenyl (meth)acrylate (Table 2, Referential Example 1).

Applicant suggests that the superior results reported in Production Examples 1-6 of

Applicant's Specification for the claimed flowability improvers reasonably rebut any prima

facie case of obvious broadly established over the combined teachings of Fischer and

Kawakami. Accordingly, the evidence of record as a whole rebuts the Examiner's suggestion

that the thermoplastic compositions and molded articles of Applicant's Claims 6-9 and the

flowability improvers of dependent Claims 12-14 would have been prima facie obvious in

view of the combined teachings of Fischer and Kawakami.

Applicant would further emphasize that the molecular weight of the flowability improver of Applicant's dependent Claim 2 is 5000 to 100000. Thus, no polymer encompassed by Applicant's Claim 2 is disclosed or reasonably suggested by Fischer, Kawakami, or any reasonable combination thereof. Fischer seeks to limit the molecular weight of its melt viscosity improvers (Fischer, col. 6, ll. 48-52). However, Kawakami seeks to increase the molecular weight of its copolymers to at least 110000 to increase the heat distortion temperature of its base thermoplastic and improve its heat resistance and fluidity to a level satisfactory for moldability. The combined teachings of Fischer and Kawakami would not have led persons having ordinary skill in the art to the specific flowability improver for engineering plastics having the molecular weight of Applicant's dependent Claim 2.

Applicant alone discovered that the claimed flowability improver improves the flowability of engineering plastics by promoting phase separation. No combination of applied prior art would have suggested that the claimed copolymers would or should function in that manner in order to produce superior results. Accordingly, the rejections of Applicant's claims under 35 U.S.C. 103 over Fischer in view of Kawakami should be withdrawn.

Rejections of Claims 10-11 under § 103 over Fischer in view of Kawakami and Okazaki

Previously presented Claims 10-11 were rejected under 35 U.S.C. 103 over Fischer in view of Kawakami and Okazaki (JP 11-181197, published July 6, 1999)(OA, p. 5, ¶ 6). As did the Examiner, we refer to the English translation of Okazaki relied upon by the Examiner. The rejection of Claims 10-11 should be withdrawn.

The Examiner finds that Okazaki discloses polycarbonate compositions including a flowability improver comprising an aromatic vinyl monomer and monomers having polar groups. While Okazaki describes a flowability improver for polycarbonates which is a polymer formed from a monomeric composition comprising at least 50% by weight of an aromatic vinyl monomer and a polar group-containing monomer (Okazaki [0009-0018]), the polar group-containing monomers Okazaki employs to make its flowability improvers are not the phenyl or substituted phenyl (meth)acrylate required by Applicant's claims.

Moreover, the Examiner does not suggest that any of the flowability improvers Okazaki discloses is the same or similar to the flowability improver Applicant claims. Rather, the combined teachings of Fischer and Kawakami are said to establish the prima facie obviousness of Applicant's claimed flowability improver and the claimed thermoplastic resin compositions therewith. Okazaki is relied upon exclusively for its teaching that polycarbonate compositions of the kind taught by Fischer may be injection molded into transparent articles such as automobile parts and electrical parts such as lamp covers because molded forms made from Fischer's improved polycarbonate compositions are said to have excellent transparency and mechanical strength. Whether or not it would have been prima facie obvious to persons having ordinary skill in the art to injection mold Fischer's polycarbonate compositions into automobile or electrical parts in view of Okazaki's teaching, however, is immaterial to the patentability of the improver or improved compositions Applicant claims, upon which Applicant's Claims 10-11 depend. No flowability improver

having at least 50% by mass of an aromatic vinyl monomer or thermoplastic composition improved thereby which Applicant's claims is reasonably suggested by the combined teachings of Fischer and Kawakami for the reasons previously stated. Accordingly, the Examiner's rejection of dependent Claims 10-11 should be withdrawn.

Rejection of Claim 3 under 35 U.S.C. 103 over Sato in view of Fischer

Previously presented Claim 3 was rejected under 35 U.S.C. 103 over Sato (JP 01-115914, published June 9, 1989) in view of Fischer (OA, p. 6, ¶ 7). We also refer to the English translation of Sato relied upon by the Examiner. The rejection should be withdrawn.

Sato describes a resin composition prepared by copolymerizing a monomeric composition comprising 20-65 wt% of a aromatic vinyl compound, 15-75 wt% of a phenyl methacrylate, and 5-30 wt% of a vinyl cyanide. The Examiner acknowledges that Sato is silent with respect to the weight average molecular weight of the resin (OA, p. 6, last sentence). Nor does Sato suggest that a resin formed from a monomeric composition comprising 20-65 wt% of a aromatic vinyl compound, 15-75 wt% of a phenyl methacrylate, and 5-30 wt% of a vinyl cyanide may be used as a flowability improver in thermoplastic compositions from which forms may be injection molded

Sato's resins are said to have excellent weather resistance, oil resistance, moisture resistance and optical properties. Sato's resins have a high degree of polymerization and are therefore "used as a molding material" (Sato, p. 6, 2<sup>nd</sup> ¶). Sato states (Sato, p. 8, 1<sup>st</sup> ¶):

The polymer obtained was . . . trial-molded by a small-scale biaxial extruder . . . and palletized [sic]. The pellet obtained was molded at 230°C by a small-scale injection molding machine to prepare a specimen with a thickness of 3 mm.

Sato also teaches (Sato, p.13, final ¶):

[The methacrylic resin of the present invention] can be used in a broad field, for example, parts such as automobiles, electric and electronic equipments, and OA equipments, mirrors, miscellaneous goods, etc.

Sato also teaches that its methacrylic resin has a high degree of polymerization (Sato, p. 6, 2<sup>nd</sup> full ¶). Sato's resin is itself a moldable copolymer. Since Sato's polymer has a high degree of polymerization, is moldable, and reasonably would have been expected to have a high molecular weight, Fischer would have suggested that Sato's polymer is unsuitable for use as a flowability improver for engineering plastics such as polycarbonates. Fischer teaches that high degrees of polymerization and increasing molecular weight of a polymer detrimentally effect its compatibility with other resins and cause detrimental phase separation (Fischer, col. 6, ll. 48-52). Persons having ordinary skill in the art reasonably would not have expected to use Sato's resin as a flowability improver for injection moldable polycarbonates not only because it would not have a high average molecular weight but also because Sato's resin appears to have substantially the same properties as thermoplastic polycarbonate resins. Indeed, the excellent weather, water and oil resistance of Sato's resin would have confirmed Fischer's teaching (Fischer, col. 6, ll. 48-52) that polymers with a "high degree of polymerization" would not be compatible with other injection moldable engineering thermoplastics and thus would not be useful as a flowability improver for engineering plastics.

The Examiner relies upon Fischer's teaching that compatibility depends upon the degree of polymerization and can be improved by controlling the molecular weight (Fischer, col. 6, ll. 48-66). However, persons having ordinary skill in the art would have had no incentive to control the molecular weight of Sato's resin for use as flowability improvers based on compatibility criteria. To the contrary, Sato's resin is said to have a high degree of polymerization suitable for moldability and Sato desires the water and/or oil resistance characteristic of incompatibility. Neither Sato nor Fischer reasonably suggest that Sato's polymers may have utility as a flowability improver.

The incompatibility properties of Sato's polymer and Fischer's teaching with regard to the incompatibility of polymers with a high degree of polymerization reasonably suggest that Sato's methacrylic resins would not be compatible with other injectable resins such as polycarbonates. Nor does Sato suggest that its methacrylic resin could or should be made compatible with other injectable resins such as polycarbonates or enable one skilled in the art to do so.

Finally, not only does Applicant's Specification teach that the claimed copolymers impart superior flowability to moldable thermoplastics, but Applicant's Specification teaches that, contrary to Fischer's instruction, superior flowability is achieved by the phase separation behavior between the claimed flowability improvers and the thermoplastic engineering plastics at the time of melt molding (Spec. [0007]). Neither Sato, Fischer, nor Kawakami recognize or reasonably suggest that a polymer mixed with an engineering plastic should show phase separation at the time of melt molding an engineering plastic for any purpose. To the contrary, Fischer denies that polymeric mixtures showing phase separation have any utility whatsoever. Therefore, persons having ordinary skill in the art reasonably would not have been led to the invention Applicant claims by any combination of the teachings of Sato, Fischer, and Kawakami. Persons having ordinary skill in the art reasonably would not have been led by the applied prior art, especially Fischer, to copolymers taught by Sato and Kawakami to improve the flowability of engineering plastics with any reasonable expectation of success. *In re O'Farrell*, 853 F.2d 894, 903 (Fed. Cir. 1988).

Application No. 10/573,831

Reply to Office Action of November 24, 2009

For the reasons stated herein, Applicant's claims are patentable over the applied prior art and in condition for allowance. Early Notice of Allowance is earnestly requested.

Respectfully submitted,

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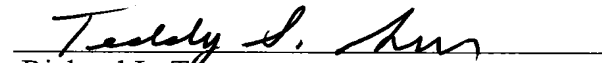
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